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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,760	10/30/2003	Minhua Lu	YOR920030499US1 (17075)	8778
23389	7590	06/27/2005	EXAMINER	
SCULLY SCOTT MURPHY & PRESSER, PC 400 GARDEN CITY PLAZA SUITE 300 GARDEN CITY, NY 11530			WANG, GEORGE Y	
			ART UNIT	PAPER NUMBER
			2871	

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/697,760	LU ET AL.	
	Examiner	Art Unit	
	George Y. Wang	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 12-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☒ Claim(s) 1-3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/30/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 12-17 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected method of forming an LCD, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on April 7, 2005.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on October 20, 2003 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

3. The drawings were received on February 11, 2004. These drawings are acceptable for examination.

Claim Objections

4. Claim 1 is objected to because there is insufficient antecedent basis for the limitation "said alignment film of inorganic material" in the claim. The reason is because the claim recites "an alignment film layer of inorganic *or* organic material" (italics

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inserted for emphasis). Thus, the alignment layer does not have to be an inorganic material. Appropriate correction is required.

5. Claim 2 is objected to because there is insufficient antecedent basis for the limitation "said material of underlayer" in the claim. The reason is because the claim itself, or the claim on which it depends, fails to recite an "underlayer." Appropriate correction is required. Note: For the purposes of examination, Examiner assumes this "underlayer" to be the groove profile beneath the alignment layer.

6. Claim 3 is objected to because there is insufficient antecedent basis for the limitation "said alignment film of inorganic material" in the claim. The reason is because the claim itself, or the claim in which it depends, recites "an alignment film layer of inorganic *or organic* material" (italics inserted for emphasis). Thus, the alignment layer does not have to be an inorganic material as the instant claim presupposes. Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-2, 4-7, and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara et al. (U.S. Patent No. 5,438,421, hereafter "Sugawara") in view of Bryan-Brown et al. (U.S. Patent No. 5,917,570, hereafter "Bryan-Brown").

9. As to claim 1, Sugawara discloses a liquid crystal display (LCD) device comprising a first substrate (fig. 5, ref. 18) having a grooved surface profile (fig. 5, ref. 16), an alignment film layer of inorganic material formed on the grooved surface and

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having a grooved surface profile, where the alignment film material (fig. 5, ref. 20) is aligned in response to an ion beam (fig. 5c, "ion beam"; col. 11, line 55) incident to the grooved surface in a direction parallel to a groove direction, a second substrate (fig. 13, ref. 41) aligned opposite the first substrate and having liquid crystal (LC) material (fig. 13, ref. 42) deposited in between.

However, the reference fails to specifically disclose the LC molecules aligning parallel to the grooves.

Bryan-Brown discloses an LCD device where the LC molecules align parallel to the grooves of the alignment film (fig. 5a).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the LC molecules align parallel to the grooves of the alignment film since one would be motivated to provide pretilted alignment that is essential in avoiding reverse tilt disclinations which can lead to poor device quality (col. 1, lines 59-62), thus providing enhanced LCD performance.

10. As per claim 2, Sugawara discloses an LCD as recited above where the material of the underlayer comprises an organic resin material (col. 11, lines 50-51).

11. As to claim 4, Sugawara discloses an LCD as recited above where the second aligned substrate (fig. 21, ref. 41) opposite the first substrate includes a top alignment layer (fig. 21, ref. 45) having a flat surface profile.

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12. As per claim 5, Sugawara discloses an LCD as recited above where the second aligned substrate (fig. 10, ref. 41) opposite the first substrate includes a top alignment layer (fig. 10, ref. 48) having a grooved surface profile.

13. As to claims 6-7, Sugawara discloses an LCD as recited above, however, the reference fails to specifically disclose a surface anchoring energy that increases when compared to LC materials deposited between flat substrate surfaces and aligning LC materials parallel to the grooves enables decreased decreased potential energy.

Bryan-Brown discloses an LCD device where the LC molecules a surface anchoring energy that increases when compared to LC materials deposited between flat substrate surfaces and aligning LC materials parallel to the grooves enables decreased decreased potential energy (fig. 5a, 5b; col. 5, lines 4-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a surface anchoring energy that increases when compared to LC materials deposited between flat substrate surfaces and aligning LC materials parallel to the grooves enables decreased decreased potential energy since one would be motivated to provide pretilted alignment that is essential in avoiding reverse tilt disclinations which can lead to poor device quality (col. 1, lines 59-62), thus providing enhanced LCD performance.

14. Regarding claims 9-11, Sugawara discloses an LCD as recited above where the grooves are not continuous along a lengthwise direction, and where the grooves

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terminate in a length direction and restart in a slightly difference location with different height and widths (fig. 1, 2), however, the reference fails to specifically disclose a grooved surface profile of the alignment film being sinusoidal.

Bryan-Brown discloses an LCD device having a grooved surface profile of the alignment film being sinusoidal (col. 1, line 57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a grooved surface profile of the alignment film being sinusoidal since one would be motivated to provide pretilted alignment that is essential in avoiding reverse tilt disclinations which can lead to poor device quality (col. 1, lines 59-62), thus providing enhanced LCD performance.

15. Claim 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara in view of Bryan-Brown, and in further view of Callegari et al. (U.S. Patent No. 6,020,946, hereafter "Callegari").

Sugawara, when modified by Bryan-Brown, discloses an LCD as recited above, however, the reference fails to specifically disclose an alignment film of inorganic material being a diamond-like carbon or selected from a group comprising amorphous hydrogenated silicon, glass, SiC, SiO₂, Al₂O₃, CeO₂, SnO₂, and ZnTiO₂.

Callegari discloses an LCD device having an alignment film of inorganic material being a diamond-like carbon or selected from a group comprising amorphous hydrogenated silicon, glass, SiC, SiO₂, Al₂O₃, CeO₂, SnO₂, and ZnTiO₂. (col. 3, lines 1-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have an alignment film of inorganic material being a diamond-like carbon or selected from a group comprising amorphous hydrogenated silicon, glass, SiC, SiO₂, Al₂O₃, CeO₂, SnO₂, and ZnTiO₂ since one would be motivated to provide an optically transparent and amorphous or fine-grained material, which are comparable to polyimide films but require fewer steps and are less costly to manufacture (col. 3, lines 8-15). Ultimately, this serves to provide greater design flexibility in LCD devices without sacrificing its optical characteristics (col. 3, lines 16-24).

Conclusion

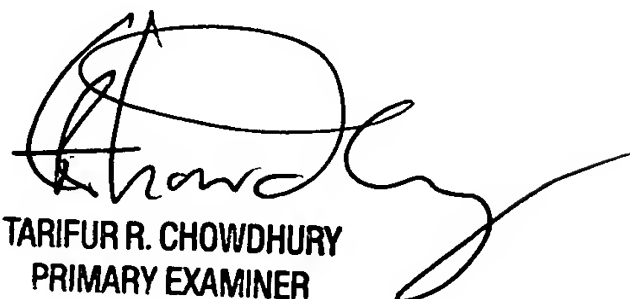
16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Y. Wang whose telephone number is 571-272-2304. The examiner can normally be reached on M-F, 8 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gw
June 23, 2005



TARIFUR R. CHOWDHURY
PRIMARY EXAMINER